

CHAPTER 3. WITHOUT-PROJECT CONDITIONS

This chapter briefly describes current and projected future without-project conditions. The magnitude of change between existing and future without-project conditions influences the scope of, and subsequent actions formulated in, the SRWRS.

EXISTING CONDITIONS

The Sacramento River, whose headwaters are controlled by Shasta Dam, is the largest river system in California. Major tributaries to the Sacramento River include the American and Feather rivers. These three rivers provide many recreational, agricultural, and environmental resources within the study area. **Figure 3-1** shows the location of the study area and vicinity in the Sacramento River watershed, including major rivers, areas, and facilities. **Table 3-1** summarizes major reservoirs shown in **Figure 3-1**.

Flow Conditions

The annual average Sacramento River flow at Verona (upstream of the confluence with the American River) is about 13.93 million AF per year, based on the 1930-2000 record maintained by the USGS (Station No. 11425500). The Sacramento River is the primary water source for the CVP, which operates major storages in upper basins, including Shasta Reservoir (4,552,000 AF, in the Sacramento River basin), Whiskeytown Lake (241,100 AF, in the Trinity River basin), and Black Butte Reservoir (143,700 AF, in the Stony Creek River basin).

The Feather River, with a drainage area of 5,921 square miles, is the largest tributary of the Sacramento River below Shasta Dam, contributing about 44 percent of the annual flow in the Sacramento River. The Feather River flows into the Sacramento River near Verona. Two major tributaries of the Feather River are the Yuba River and the Bear River, contributing on average about 30 percent of total Feather River flow.

The largest storage facility in the Feather River watershed is Lake Oroville with a capacity of 3,537,600 AF. The reservoir is owned and operated by DWR. Other major reservoirs include New Bullards Bar Reservoir on the North Yuba River (969,600 AF, owned and operated by Yuba County Water Agency (YCWA)), and Lake Almanor on the North Fork Feather River (1,308,000 AF, owned and operated by Pacific Gas and Electric Company (PG&E)). Through PG&E's Drum-Spaulding Project, PCWA receives water diverted from the Yuba and Bear rivers. Reclamation does not own or operate any major water supply facilities in the Feather River watershed.



Shasta Dam and Lake

The American River is another major tributary to the Sacramento River. The American River basin encompasses about 1,936 square miles and ranges in elevation from 23 feet to more than 10,000 feet above mean sea level (msl). The average annual flow of the American River at Fair Oaks (USGS Station No. 11446500) has been approximately 2.7 million AF per year from 1905 through 2003. It contributes about 15 percent of total Sacramento River flow below the confluence at Sacramento. The largest reservoir in the basin, Folsom Reservoir (975,000 AF), is owned and operated by Reclamation for the CVP. Other major reservoirs include the Union Valley Reservoir on Silver Creek (230,000 AF, owned and operated by SMUD), PCWA's Hell Hole Reservoir on the Rubicon River (208,400 AF), and French Meadows Reservoir behind the L.L. Anderson Dam on the Middle Fork American River (111,300 AF).



Figure 3-1. SRWRS Study Area and Vicinity Map

Table 3-1. Major Reservoirs Within the Study Area and Vicinity

Reservoir (Dam)	River	Owner ^[1]	Capacity (AF)	DOB ^[2]	Purposes (Uses of Water)
Black Butte	Stony Creek	USACE	143,700	1963	Flood Management, Storage (irrigation, recreation)
Folsom	American	Reclamation	975,000	1956	Multipurpose (hydropower, irrigation, recreation)
French Meadows (L.L. Anderson)	Middle Fork American	PCWA	111,300	1965	Diversions, Storage (domestic, irrigation, municipal, recreation)
Hell Hole	Rubicon	PCWA	208,400	1966	Diversions, Storage (domestic, hydropower, irrigation, recreation)
Lake Almanor (Canyon)	North Fork Feather	PG&E	1,308,000	1927	Diversions, Storage (hydropower, irrigation)
New Bullards Bar	North Yuba	YCWA	969,600	1970	Multipurpose (domestic, hydropower, irrigation, municipal, recreation, flood management)
Oroville	Feather	DWR	3,537,600	1968	Multipurpose (hydropower, irrigation, municipal, recreation, flood management)
Shasta	Sacramento	Reclamation	4,552,000	1945	Multipurpose (irrigation, hydropower, municipal, recreation, flood management)
Union Valley	Silver Creek	SMUD	230,000	1963	Storage (hydropower, recreation)
Whiskeytown	Clear Creek	Reclamation	241,100	1963	Multipurpose (hydropower, irrigation, municipal)

^[1] Reservoir Owners:
DWR California Department of Water Resources
PCWA Placer County Water Agency
PG&E Pacific Gas and Electric Company
Reclamation Bureau of Reclamation
SMUD Sacramento Municipal Utility District
USACE United States Army Corps of Engineers
YCWA Yuba County Water Agency

^[2] DOB: Completion date of dam and beginning of operation.

Below its confluence with the American River at Sacramento, the Sacramento River continues to flow down to the Delta, where it merges with the San Joaquin River, and then flows through San Francisco Bay to the Pacific Ocean. About 62 percent of total Delta inflow is from the Sacramento River, including additional CVP and SWP releases under the WQCP. Both the CVP and SWP export water to the San Joaquin Valley and Southern California through the Tracy and Banks pumping plants located in the south Delta.

Water Quality

Surface water quality is a function of the mass balance of water quality from tributary streams, diversions, agricultural return flows, subsurface drainage flows, permitted discharges from M&I sources, and urban runoff. While suitable for drinking water purposes, the Sacramento River, below Shasta Lake to its confluence with the American River, experiences variable water quality conditions largely influenced by flow conditions, temperature, agricultural runoff, and mine drainage from the Iron Mountain area. From the

confluence with the American River to the Delta, water quality varies due to urban runoff, the amount of flow from the American River, and agricultural runoff.

Feather River water quality generally degrades as water moves downstream from Lake Oroville to its confluence with the Sacramento River as a result of agricultural drainage, particularly from the Sutter Bypass. The quality of water in the American River is generally high from the river's headwaters to its confluence with the Sacramento River.

Fisheries

More than 30 species of fish are known to use the Central Valley portion of the Sacramento River, which extends from Keswick Dam to the Delta. The upper section of the Sacramento River, between Keswick Dam and Princeton, is of primary importance to native anadromous species, and is presently used for spawning and early life-stage rearing, to some degree, by steelhead, green sturgeon, and all four runs of Chinook salmon (i.e., fall, late-fall, winter, and spring runs). Consequently, various life stages of steelhead, green sturgeon, and all four runs of Chinook salmon can be found in the upper Sacramento River throughout the year.

The lower portion of the Sacramento River extends from Princeton to the Delta, and includes the confluences of both the Feather and American rivers. The lower Sacramento River is predominantly channelized, leveed, and bordered by agricultural lands. Aquatic habitat in the lower Sacramento River is characterized primarily by slow-water glides and pools; is depositional in nature; and has reduced water clarity and habitat diversity relative to the upper Sacramento River. This section of the river has no spawning habitat for salmonids, but serves as a migratory corridor for (1) fish that spawn in the upper Sacramento River and its tributaries, (2) anadromous fish that spawn in the Feather River and American River basins, and (3) fish emigrating to the Delta. Striped bass and American shad, two nonnative anadromous species, spawn in the lower Sacramento River. Other special status-species occurring in the Sacramento River include Sacramento splittail, Delta smelt, and hardhead.

The Feather River and its tributaries are spawning grounds for several special-status anadromous species, including fall-run and spring-run Chinook salmon, steelhead trout, Sacramento splittail, and green sturgeon. Striped bass and American shad, two nonnative anadromous species, also spawn in the Feather River. Fall- and spring-run Chinook salmon, steelhead, and shad also spawn in the Yuba River, a major tributary of the Feather River.

Folsom Lake and Lake Natoma on the American River support a great diversity of fish species, many of which were introduced. Strong thermal stratification occurs within Folsom Reservoir annually between April and November. Thermal stratification establishes a warm surface water layer and a deeper coldwater layer near the bottom of the reservoir. As a result, the reservoir supports both warmwater and coldwater fisheries. Coldwater releases from the lower elevations in Folsom Reservoir sustain coldwater fisheries in Lake Natoma and help maintain water temperature in the lower American River.



Folsom Dam and Lake

The lower American River below Nimbus Dam is used by over 43 species of fish, including numerous resident native and introduced species, and several anadromous species such as fall-run Chinook salmon, steelhead, Sacramento splittail, striped bass, and American shad. This stretch of the river extends 23 miles. The lower American River provides several types of aquatic habitat, including shallow habitat, fast-water riffles, glides, runs, pools, and off-channel backwater.

Seasonal releases from Folsom Lake's coldwater pool provide thermal conditions in the lower American River that support annual in-river production of anadromous salmonid species. Folsom Reservoir's annual coldwater pool volume is not sufficiently large to facilitate coldwater releases from July through September to provide maximum thermal benefits to juvenile steelhead rearing in the lower American River over the summer, and coldwater releases from October and November to benefit fall-run Chinook salmon migration, spawning, and incubation. Consequently, optimal management of the reservoir's coldwater pool on an annual basis is essential to provide the most favorable thermal benefits to both steelhead and fall-run Chinook salmon within the constraints of annual coldwater pool availability.

The Delta and San Francisco Bay together comprise the largest estuary on the West Coast. Over 120 fish species inhabit this estuary during at least a portion of their life cycles. Delta species include many anadromous species, and freshwater, brackish water, and saltwater species. Special-status species of the Delta include all four Chinook salmon runs, steelhead trout, sturgeon, Delta smelt, Sacramento splittail, and longfin smelt. Other species of primary management concern include American shad and striped bass. The Delta is a primary habitat for striped bass, Sacramento splittail, sturgeon, Delta smelt, and longfin smelt.



Fish weir at Nimbus Fish Hatchery

Vegetation and Wildlife

The vegetation of the Sacramento River system supports a diversity of terrestrial wildlife species and reflects the Great Valley and Sierra Nevada foothill bioregions of California. Plant community composition within these regions includes riparian, grassland, oak woodland, chaparral, conifer forest, and emergent wetland vegetation types. These terrestrial habitats provide seasonal and year-round habitat for many species of native and introduced wildlife. The following description is an overview of the vegetation and wildlife associated with the Sacramento River, its two major tributaries (the Feather and American rivers), and the NCC.

The Sacramento River supports some riparian vegetation; however, it is limited to narrow bands between the river and the riverside of the levee. Riparian vegetation on the Sacramento River is not as diverse as on the American River. The Sacramento River riparian community consists of valley oak, cottonwood, wild grape, box elder, elderberry, and willow. The shores of the lower Sacramento River are characterized by agricultural use.

Vegetation in the Feather River watershed is diverse, ranging from mixed conifer and deciduous forest to sparse ponderosa pine plant communities. Long-term vegetation disturbance and consequent gully erosion have led to dramatic changes in the hydrology of the Feather River and its tributaries, resulting in reduced summer flow, higher summer water temperatures, lower water tables, reduced meadow storage capacity, and a trend from perennial to intermittent flow. Many down-cut streams no longer sustain late-season flow, causing adverse consequences to riparian and upland vegetation, aquatic communities, and downstream water users.

The NCC joins the Sacramento River downstream from the mouth of the Feather River and upstream from the American River. This channel supports a dense riparian association of black willow, shining willow, and cottonwood. Riparian cover within the channel provides nesting, thermal, and escape covers for local wildlife populations. The channel also serves as a wildlife movement corridor for wildlife accessing the Sacramento River.

Numerous species existing throughout Sacramento County are state-listed or federally listed as threatened or endangered or are candidates for listing under the Federal ESA. Sensitive plant species potentially occurring

in the area include Sanford's arrowhead and Sacramento Orcutt grass. Sensitive wildlife species include Swainson's hawk, valley elderberry longhorn beetle, bank swallow, and giant garter snake. In addition, Sacramento County contains numerous vernal pools, some of which may be inhabited by the Federally listed vernal pool tadpole shrimp and fairy shrimp, and several sensitive plant species.

Throughout the Sacramento River basin, native species have declined due to introduction of invasive nonnative species of plants and wildlife. Native riparian vegetation has been replaced with introduced tamarix, giant reed, and tree-of-heaven. Populations of nonnative species, including red fox, bullfrog, and brown-headed cowbird, have reduced native wildlife populations.



Riparian zone along the Feather River

Land Use/Recreation

Sacramento County includes extensive areas of both urban and agricultural uses. The Sacramento metropolitan area is one of the fastest growing urban regions in California. The county's 1990 population is nearly 4 times that of the 1950 population and 97 percent of the population in the SRWRS study area is considered urban. Sacramento's statewide role, the prevalence of outdoor recreation opportunities, and the availability of land have contributed to this growth and are likely to continue to be a draw for future urbanization. The southern and southeastern portions of Sacramento County are dominated by a variety of agricultural uses, including croplands and rural residential land use.

Placer County also has experienced significant growth since 1950. The southern portion of the county has become increasingly urbanized with the influx of industry and new residential development into the Roseville-Rocklin area in the 1980s. Roseville, the largest city in this part of the county, grew fivefold in the past 40-year period. Continuation of urban growth in the county is accounted for in local General Plans.

Sutter County, which also has experienced consistent growth, has not grown as fast as Sacramento and Placer counties. The southwestern corner of Sutter County is dominated by agricultural use, mainly tree and field crops (rice in particular). The area is sparsely populated (20- to 80-acre parcel minimums) and has no incorporated or urban areas.



Beach area at Beals Point in Folsom Lake State Recreation Area

The Sacramento River, Feather River, and American River (including Folsom Lake and Lake Natoma) provide extensive water-related recreation opportunities. The tributaries of the American River are heavily used for whitewater rafting. Downstream, the 18,000-acre Folsom Lake and recreation area offers opportunities for fishing, hiking, biking, swimming, running, camping, picnicking, horseback riding, water skiing, and boating.

Folsom Lake is entirely within Folsom Lake State Recreation Area (SRA), administered by the California Department of Parks and Recreation. Folsom Lake SRA is one of the most popular recreation areas in the state with average annual visits of nearly 2.6 million. Predominant recreational uses are water-related, such as boating and water skiing. Downstream of Folsom Dam, Lake Natoma, the Folsom Dam afterbay, is also a unit of Folsom Lake SRA. Developed recreation facilities include picnic areas, bicycle and pedestrian trails,

boat launch ramps, and campgrounds. On average, the lake supports about 500,000 visitor use days per year; the predominant recreational activity is trail use.

The lower American River, from Nimbus Dam to its confluence with the Sacramento River, is designated as recreational river by both the Federal and State governments under the National and State Wild and Scenic Rivers acts, respectively. Under the National Wild and Scenic Rivers Act (PL 90-542, 16 USC 1271 *et seq.*), Federally assisted projects affecting the lower American River are subject to the Secretary of the Interior's determination that the projects "will not ... unreasonably diminish" the river's recreational value. The State act restricts construction of diversions unless the Secretary of the California Environmental and Natural Resources Agencies determines that construction is needed to supply domestic water to residents of the county and will not adversely affect the natural character of the river.

In addition, approximately 29 miles of the lower American River from Folsom Dam to its confluence with the Sacramento River are included in the American River Parkway Plan, an element of the Sacramento County General Plan. The American River Parkway (Parkway) consists of 14 interconnected parks and a continuous trail system, encompassing approximately 5,000 acres. The County of Sacramento estimated that more than 5 million visitors per year use the Parkway and the Parkway's Jedediah Smith Memorial Trail.

There are many recreation opportunities on the Sacramento River from its confluence with the Feather River downstream to Courtland, including boating, fishing, canoeing, rafting, swimming, and picnicking. Fishing is one of the biggest uses of the Sacramento River. Several boat launching and regional park facilities are located along the Sacramento River. The Sacramento River from the Feather River to Cache Slough Junction, a few miles upstream from Rio Vista, is one of the more popular sections for boating. The several-thousand-acre Stone Lakes National Wildlife Refuge is located within this southern portion of Sacramento County, east of the Sacramento River, and provides hiking and wildlife viewing opportunities.

The Feather River supports extensive water-related recreation activities at Feather River Canyon, upstream and northeast from the river's confluence with the Sacramento River. Several marinas, boat ramps, and river parks are located near the confluence of the Sacramento and Feather rivers.

Aesthetics

The Sacramento River segment with the richest visual variety extends from Keswick Dam downstream to Red Bluff. The segment below that, extending from Red Bluff to the confluence with the lower American River, is largely confined by levees and rock revetment bank protection. The latter segment has less visual variety and is considered less pristine in appearance than the upper section of the river. The lower Sacramento River, extending from its confluence with the lower American River downstream to the Delta, is not considered visually sensitive as it is now leveed and bordered by agricultural land.

The visual character of the Sacramento River south of Verona is typified by large expanses of flat agricultural lands divided by vegetated waterways and developed uses. Visual perceptions of the area are most easily characterized according to the viewer's location: views from the river, and views from the levee areas. Vistas from the river and from riverside residences are primarily short-range, due to the higher elevation of the adjacent levees. Foreground views from the water consist of levees, riparian vegetation, and occasional riverside residences and docks. From the levee adjoining the river, the surrounding area appears vast and open. Foreground views from the levee generally consist of roadside vegetation, orchards, and cultivated fields. Middle-ground and background views of roadways, agricultural lands, and developed uses tend to blend due to the area's overall flatness. The Sierra Nevada and Coast Range are visible to the east and west, respectively, on occasional clear days.

The Feather River segment near its confluence with the Sacramento River is located in an agricultural area in Sutter County. The terrain is generally flat, with little variation. The river channel is wide and contains turbid, slow-moving water. The river is visible from the Garden Highway, which is not heavily used, and views of the river are limited because of the surrounding flat topography.

The lower American River is considered to exhibit high scenic quality. Visual characteristics of the lower American River consist of steep bluffs, terraces, islands, backwater areas, and riparian vegetation. The lower American River is divided into three visual components. The upper river visual component extends from Nimbus Dam downstream to the Gristmill Dam Recreation Area, consists of steep bluffs, terraces, riparian vegetation, and shallow water areas, and is considered the most visually sensitive area along the river. The middle visual component is not considered as diverse as the upper river and consists of moderately sloped embankments, riparian vegetation, and shallow water areas. The lower visual component is considered the least visually sensitive and is primarily gravel banks, riffles, and ponds.



American River downstream of the Nimbus Fish Hatchery

Cultural Resources

Cultural resources include physical resources and intangible cultural values pertaining to paleontology, prehistoric and historic archaeology, history, and Native American ethnography. Paleontological resources include fossil animals and plants of scientific value. Archaeological resources include evidence of past human activities, both prehistoric and historic. Historic resources also include extant structures. Ethnographic resources may include natural or cultural resources, landscapes, or natural environmental features that are linked by a community, or group of communities, to the traditional practices, values, beliefs, history, and/or ethnic identity of that community or wider social group.

Several dozen prehistoric sites have been identified along the lower American, North Fork American, and lower Sacramento rivers. These include village sites, bedrock milling stations, lithic scatters, and small campsites. More than a hundred prehistoric sites have been identified within the Folsom Reservoir basin. Of particular concern are sites located within reservoir inundation areas. Such sites are subject to degradation due to reservoir siltation, erosion from fluctuating surface water elevations, and vandalism when exposed by low surface water elevations.

Historic sites along the lower American River, North Fork American River, and lower Sacramento River include placer mining districts, railroad-related structures, irrigation and hydroelectric facilities, and historic residential structures.

Ethnographic resources include historic Nisenan (southern Maidu) village sites located along the lower Sacramento, lower American, and North Fork American rivers. Many archaeological sites in the area contain burials, and human remains are of substantial concern to contemporary American Indian people. Several Federally recognized tribes are located within the SRWRS area. These include the United Auburn Indian Community of the Auburn Rancheria in Placer County and the Shingle Springs Band of Miwok Indians in El Dorado County. No Federally recognized tribes exist in Sacramento or Sutter counties. However, the State recognizes several other local groups of Native Americans.

Soils and Geology

Sacramento Valley soils are alluvial in nature and found in deep alluvial fans and floodplains. These soils are highly valued for irrigated crops. Soils found along the edges of the Central Valley include brown neutral

and red iron pan soils. Soils in Sacramento County have been significantly influenced by human activities for uses such as cultivation and urban development. Historically, gold dredging, hydraulic mining, drainage system development, creation of levees, and cut and fill all have contributed to modifying the original soils. Geologic formations underlying the foothills portion of the study area consist of complex folded and faulted, metamorphosed volcanic and sedimentary rocks that have been eroded to a landscape of moderate relief and thin soils.

Water Supply Conditions

Statewide sources of water supply, and water supply in the study area, are described in this section.

Statewide Water Supply Projects

The regional water supply in California is facilitated mainly through operations of the CVP and SWP to meet in-basin needs and provide exports for areas south of the Delta. In addition to water supplies provided by the CVP and SWP, groundwater resources within the Sacramento Valley and San Joaquin Valley provide significant water supplies to local agricultural and M&I water users. Numerous local and regional projects also provide surface water, groundwater, and other supplies. To be consistent with ongoing statewide water supply projects/studies and CALFED ROD implementation, water supply and demand conditions in 2001 are used as existing conditions.

In 2001, CVP deliveries totaled about 5.7 million AF, or about 80 percent of its total contracted deliveries of 7.1 million AF.¹¹ These deliveries included approximately 2.9 million AF to the Sacramento River Service Area, 192,000 AF to the American River Service Area, and 2.6 million AF to the Delta Export Service Area.

In 2001, SWP deliveries totaled approximately 1.6 million AF, or about 39 percent of the SWP's total contracted deliveries of 4.1 million AF.¹² These deliveries included 31,900 AF to contractors north of the Delta (e.g., Feather River and North Bay) and 1.6 million AF to contractors south of the Delta (e.g., South Bay, San Joaquin Valley, central coast, and Southern California contractors).

Water Supply in the Study Area

Water supply in the SRWRS study area is mainly from surface water diversions from the American and Sacramento rivers and groundwater extraction, although water supplies also are imported from other river basins through the Drum-Spaulding System, owned and operated by PG&E.

Surface Water Supply

Table 3-2 summarizes service areas in the study area by surface water diversion points on the American and Sacramento rivers. The current maximum of water rights/contract entitlements and existing surface water diversions of SRWRS cost-sharing partners is summarized in **Table 3-3**.

Groundwater Supply

The extent of the groundwater basin associated with the study area includes the northern Sacramento County and southern Placer County portions of California's Great Valley Physiographic Province. The groundwater

¹¹ CVP delivery data for 2001 from E-mail communication with Reclamation (January 2003).

¹² SWP delivery data for 2001 from DWR Web site (www.swpao.water.ca.gov/water.html), Notice to Contractors Number 01-15.

Table 3-2. Existing Authorized Diversions and Service Areas Within the Study Area

Authorized Diversion Point	Service Area
Sacramento River	
Near Sacramento International Airport	Natomas Mutual Water Company
Near Discovery Park	City of Sacramento
Near Freeport	East Bay Municipal Utilities District Sacramento County Water Agency
American River	
Auburn Dam Site	Placer County Water Agency (MFP water rights)
Folsom Reservoir	City of Folsom City of Roseville El Dorado Irrigation District Folsom Prison Placer County Water Agency (MFP water rights and CVP entitlement) Sacramento Suburban Water District San Juan Water District (including Citrus Heights Water District, Orange Vale Water Company, Fair Oaks Water District, City of Folsom)
Folsom South Canal	Arden Cordova Water Service Company Clay Water District Galt Water District Mather Air Force Base Omochumne-Hartnell Water District Sacramento County Water Agency Sacramento Municipal Utilities District
Near Landis Avenue and Ancil Hoffman Park	Carmichael Water District
Near Arden Bar	Sacramento Suburban Water District
Above H Street Bridge to confluence	City of Sacramento

basin is part of the 400-mile-long regional Central Valley aquifer system extending from Red Bluff to Bakersfield.

Under historical natural conditions, groundwater flow underlying northern Sacramento County beneath the study area was westward from areas of recharge in the foothills toward areas of discharge near the Sacramento River. According to DWR,¹³ groundwater levels were relatively stable between 1930 and 1940. Increased reliance on groundwater pumping since the 1940s has modified these conditions and groundwater levels have dropped an average of approximately 1 foot per year beneath parts of northern Sacramento County. Recent groundwater conditions (see **Figure 3-2**) are represented by fall 1998 groundwater level contours. Notable features include the following:

- Persistent groundwater cone of depression in the southern portion of the basin, along the Sacramento County/Placer County boundary
- Sacramento and American rivers acting as sources of recharge, as shown by the mounding of groundwater under and adjacent to the riverbeds

¹³ DWR. 1974. Evaluation of Ground Water Resources: Sacramento County, Bulletin 118-3.

- East to west gradient resulting from recharge from the High Sierra

Historically, agricultural users in Placer County have used groundwater. PCWA has not used groundwater as an M&I supply due to restrictions in the existing Placer County General Plan. Roseville has sufficient surface water supplies to meet existing demands; thus, groundwater normally has not been used as a water supply. Until recently, SSWD has mostly relied on groundwater to meet its customers' needs. Since 2000, surface water also has been introduced by SSWD for in-lieu recharge in the PCWA-SSWD

Groundwater Stabilization Project. Historically, Sacramento has used both groundwater and surface water to meet demands.

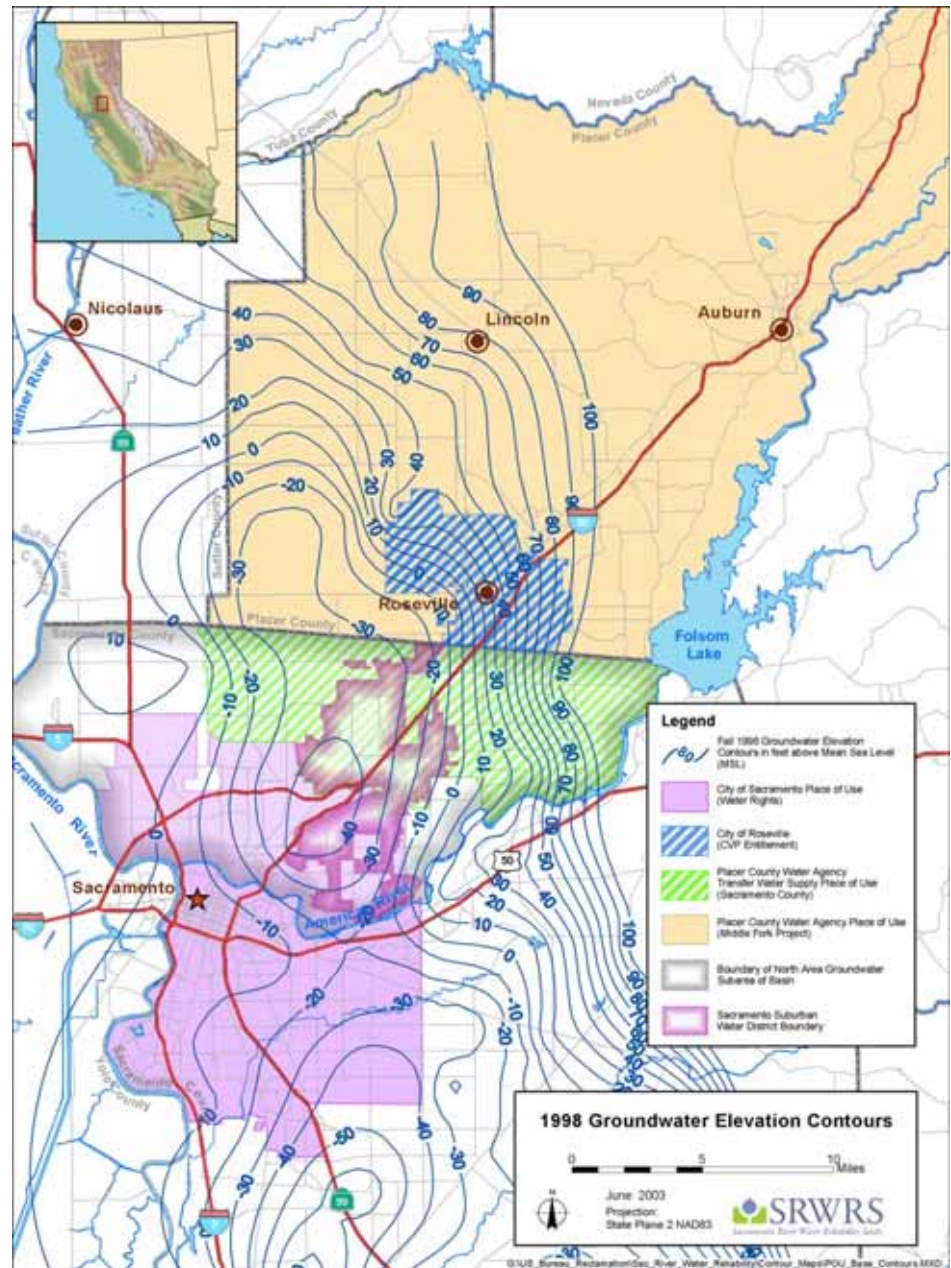


Figure 3-2. 1998 Groundwater Surface Elevations Within the SRWRS Study Area

Table 3-3. Existing Surface Water Use Compared with Available Water Rights and Contract Entitlements, by SRWRS Cost-Sharing Partner

Water Purveyor	Surface Water Sources	Currently Authorized Points of Diversion	Water Rights/ Contract Entitlements (AF per year)	Amount Contracted to Other Water Purveyors (AF per year)	Existing Diversion by Water Purveyor ^[1] (AF per year)
PCWA	MFP water rights	Auburn Dam Site, Folsom Dam	120,000	84,000 ^[2]	13,000
	PG&E water supply contract	Drum-Spaulding Canal System	100,400		100,400
	CVP entitlement	Folsom Dam	35,000 ^[3]		0
SSWD	PCWA water sale agreement	Folsom Dam	29,000		15,300
	Sacramento water delivery agreement	Fairbairn WTP	26,064		
Roseville	PCWA water sale agreement	} Folsom Dam	30,000		} 35,600
	SJWD water transfer agreement		4,000 ^[4]		
	CVP entitlement		32,000		
Sacramento	Water rights (American River)	Above H Street Bridge to confluence	245,000	28,644 ^[5]	} 124,900
	Water rights (Sacramento River)	Near Discovery Park	81,800		

^[1] Preliminary data provided by cost-sharing partners for 2001 and 2002; amounts are subject to revision. The amount of diversion does not include diversions of other purveyors based on water sale contracts and/or water delivery agreements.

^[2] PCWA has water sale contracts with SJWD (up to 25,000 AF), Roseville (up to 30,000 AF), and SSWD (up to 29,000 AF).

^[3] According to the currently negotiated PCWA Amendatory contract, which reduces PCWA's entitlement from 117,000 AF per year to 35,000 AF per year, and moves the authorized diversion point from the Auburn Dam site to Folsom Dam.

^[4] The agreement provides for a 4,000 AF transfer amount only in years when March-through-November unimpaired inflow to Folsom Lake is above 950,000 AF.

^[5] Sacramento has a 1964 agreement with SSWD (formerly Arcade Water District) for up to 26,064 AF of raw water delivery, and a water sale contract with Cal-American (up to 2,580 AF).

FUTURE WITHOUT-PROJECT CONDITIONS

The future without-project conditions include some of the expected physical, environmental, and socio-economic conditions generally expected to occur in the future in the study area. These conditions are used for planning purposes¹⁴ at this stage of study development to assess the water supply options of each cost-sharing partner.

Physical Environment

Basic physical conditions in the Placer-Sacramento area are expected to remain relatively unchanged in the future. No changes to area topography, geology, or soils are foreseen. From a river geomorphic perspective, major rivers in the Sacramento River basin are regulated and thus, ongoing restoration efforts may have only localized effects. Without major changes to the river systems, which are unlikely, hydrologic conditions will probably remain unchanged. Discussions are occurring regarding potential changes in the region's hydrology due to global warming effects; scientific work in this field of study is continuing.

Biological Environment

Significant efforts are underway by numerous agencies and groups to restore various biological conditions throughout the study area. These efforts include elements of the CALFED programs, AFRP program, and Water Forum efforts. As population and urban growth continues and land uses are converted to urban centers, many wildlife species especially dependent on woodland, oak woodland, and grassland habitats may be affected. However, through the protection of relevant laws and significant efforts of Federal, State, and local agencies, populations of anadromous fish and special status species would be expected to generally remain as under existing conditions.

For environmental purposes, WFA signatories are individually or collectively currently implementing and/or developing several water management actions stipulated in the WFA:

- Reducing future diversions from the American River in dry years to maintain flows in the lower American River. Diversion limitations would be observed by individual water purveyor according to their WFA PSAs.
- Developing an FMS for the lower American River, which includes releasing supplemental flows from PCWA's MFP storage in dry years to augment flows in the lower American River. The FMS is currently under development by Reclamation, the Water Forum, and USFWS.
- Seeking diversions on the Sacramento River to reduce future diversions from the American River. The SRWRS is under development by Reclamation and the cost-sharing partners.

The first action imposes constraints on surface water supply to the Placer-Sacramento region, as explained later in this chapter. The other two actions require further federal decisions for implementation and thus, are not included in the future no-action conditions.

Social and Economic Environment

According to a March 2001 projection by the Sacramento Area Council of Governments (SACOG), the population of the Placer-Sacramento area would increase by about 700,000 between 1999 and 2025, which is about a 50 percent increase from the 1999 population level. Along with Reclamation, Sacramento and

¹⁴ The basis of comparison for NEPA and CEQA compliance will be established later during EIS/EIR development.

PCWA are two major water rights holders in the American River basin. In addition to meeting their own water supply needs, water from the water rights of these two agencies has been contracted to local agencies to satisfy regional water supply needs.

Projected Demands

The General Plans of Sacramento County, Placer County, Sacramento, and Roseville have provisions for planned development and urbanization. Projected future demands were reported in the WFA analysis as the basis for its programmatic planning process. With a planning horizon through 2030, WFA analysis reflects the General Plans of Placer and Sacramento counties and incorporated cities. The WFA also incorporates a projected 25.6 percent of demand reduction due to implementation of best management practices (BMPs) for water conservation. These BMPs constitute major components of RWA's Water Efficiency Program (WEP) to improve water efficiency for urban conservation, which also speaks to the conservation goals of the California Urban Water Conservation Council, CVPIA, and CALFED Bay-Delta Program.

Projected demands for the cost-sharing partners are consistent with WFA assumptions, including updates from recent planning efforts such as PCWA's 2003 Water Supply Infrastructure Plan, Roseville's 2004 West Roseville Specific Plan, and the County of Sacramento's 2004 Zone 40 Master Plan. The following summarizes these projected 2030 demands, **Table 3-4** tabulates the demands by cost-sharing partner, and **Figures 3-3** through **3-6** show locations of planning areas identified in the table.

- **PCWA.** The estimated M&I demand is 85,400 AF per year, assuming a slow growth scenario under water shortage conditions. **Figure 3-3** shows the PCWA service area. PCWA is the only agency among the cost-sharing partners responsible for supplying water for agricultural purposes. PCWA plans to serve projected M&I demand with surface water in all hydrologic conditions, except during emergencies or for peaking during daily operation, to be consistent with provisions in the Placer County General Plan that limit groundwater use for urban development in unincorporated areas.
- **SSWD.** The estimated demand of 99,289 AF per year is for SSWD and its wholesale service area (see **Figure 3-4**). SSWD plans to serve the projected demand mainly by groundwater with supplemental surface water from PCWA and Sacramento per its corresponding water contracts.
- **Roseville.** The estimated demand of 64,020 AF per year is for Roseville (including the recent August 2004 annexation of the West Roseville Specific Plan area) and remaining 2,358 acres of unincorporated area in the Roseville/Placer County Memorandum of Understanding Area (MOU Area). The MOU Area extends west to the current city limits; Roseville has the first right of refusal for its development. **Figure 3-5** shows Roseville city limits and the MOU area.
- **Sacramento.** The threat of groundwater contamination and concern over groundwater overdrafting have resulted in requests for surface water delivery from Sacramento on retail or wholesale bases. (The previously mentioned delivery to SSWD is in this category.) As a regional approach, the total treated water demand of Sacramento is 239,804 AF per year, and would be used for providing retail and wholesale services to areas within the city limits, Sacramento's water right permits POU, and existing commitments of groundwater wholesale to areas in the County of Sacramento (shown in **Figure 3-6**). With the exception of areas outside its POU, Sacramento plans to use surface water for the above projected demands in all years, and reserve groundwater use for emergencies.

Sacramento also has contracts with the County of Sacramento to wheel water for unincorporated areas such as Sacramento County Zone 40 south of the American River, and Zone 50 (Sacramento International Airport, and Metro Air Park) in the Natomas Basin. These commitments represent additional needs in facility capacity for diversion, treatment, and transmission, as shown in **Table 3-5**. Facility capacity needs are shown in maximum-day demand (max-day demand), the

estimated maximum daily use in a year, which is commonly presented in mgd and used as the design capacity for water supply facilities.

Table 3-4. Summary of Projected Future Demand by SRWRS Cost-Sharing Partner

SRWRS Cost-Sharing Partners and Service Areas	Projected Future Demand (AF per year)		
	Agricultural Use	M&I Use	Total
PCWA			
Zone 1 Canal Delivery Area (including foothill communities such as Auburn, Loomis, and Penryn, which have very limited or no groundwater accessibility)	70,000	0	70,000
Zone 1 Treated Water Delivery Area (area in Western Placer County, including incorporated cities of Lincoln and Rocklin)	0	85,400 ^[1]	85,400
Zone 5 (Western Placer County near Sutter County line; PCWA provides up to 15,000 AF per year of supplemental water supply for agricultural use)	70,000 ^[2]	0	70,000
PCWA Subtotal	140,000	85,400	225,400
SSWD			
SSWD (service areas of former water purveyors such as Northridge Water District, Arcade Water District, and McClellan Air Force Base)	0	48,373	48,373
SSWD Wholesale Area (Rio Linda/Elverta Community Water District, Cal-American Water Company (Antelope and Royal Oak/Lincoln Oaks), Del Paso Manor Water District, Sacramento County Water Agency (Arden Park Vista), and Southern California Water Company (Arden Town))	0	50,916	50,916
SSWD Subtotal	0	99,289	99,289
Roseville			
City Limits (including August 2004 annexation of West Roseville Specific Plan)	0	51,620	51,620
Remaining MOU Area (2,358 acres of unincorporated area in the Roseville/Placer County MOU Area, which extends west to the city limits, where Roseville has the first right of refusal for its development)	0	12,400	12,400
Roseville Subtotal	0	64,020	64,020
Sacramento			
City Limit and Pending Annexation Areas (including Freeport, Sacramento County Water Agency (Northgate), and Sacramento Municipal Utility District Cogeneration Facility)	0	161,974	161,974
Area D, Outside City Limits (including a portion of SSWD, Cal-American (Arden), Del Paso Manor Water District, Southern California Water Company (Arden Town), and Sacramento County Water Agency (Arden Park Vista)) ^[3]	0	30,222	30,222
Remaining POU Area (a portion of Cal-American (Rosemount and Countryside), Florin County Water District, Unincorporated Area (Zone 40), Fruitridge Vista Water Company, and Tokay Park Water District)	0	40,472	40,472
Areas Outside POU, South (Sacramento Regional County Sanitation District Wastewater Treatment Plant)	0	520	520
Areas Outside POU, North (Sacramento International Airport, and Metro Air Park (Zone 50)) ^[4]	0	6,616	6,616
Sacramento Subtotal	0	239,804	239,804
Cost-Sharing Partners' Total^[3]	140,000	481,451	621,451

^[1] PCWA's M&I demand was based on the slow growth scenario in the PCWA Water Supply Infrastructure Plan (MWH, 2003).

^[2] Per Placer County's request, PCWA committed to provide up to 15,000 AF per year of surface water to supplement a total agricultural demand of around 70,000 AF per year.

^[3] Area D is defined in Sacramento's water right permits. A portion of Area D is within city limits, and the remaining area is within either the SSWD service area or its wholesale area. The "Cost-Sharing Partners' Total" excludes the overlapping demands.

^[4] Sacramento would provide groundwater wholesale service to Zone 50 as an interim measure before the County of Sacramento could provide a permanent source of water wheeling through Sacramento's facility for use in this area.

Table 3-5. Summary of Projected Capacity Needs for Sacramento

Retail and Wholesale Service Areas of Sacramento*	Water Supply Demand (AF per year)	Capacity Need (mgd)			
		By Function		By Source	
		Max-Day Demand	Wheeling Request	Surface Water	Groundwater
City Limits	161,974	259		259	
Area D, Outside City Limits	30,222	50		50	
Other POU's	40,472	69		69	
Outside POU, South	520	1			1
Outside POU, North ^[1]	6,616	12			12 ^[1]
Sacramento County Zone 40			11	11	
Sacramento County Zone 50 ^[1]			12	12 ^[1]	
Total	239,804	391	23	401	13

* Based on categories in Table 3-4.

^[1] Sacramento would provide groundwater wholesale service to Zone 50 as an interim measure before the County of Sacramento could provide a permanent source of water wheeling through Sacramento's facility for use in this area.

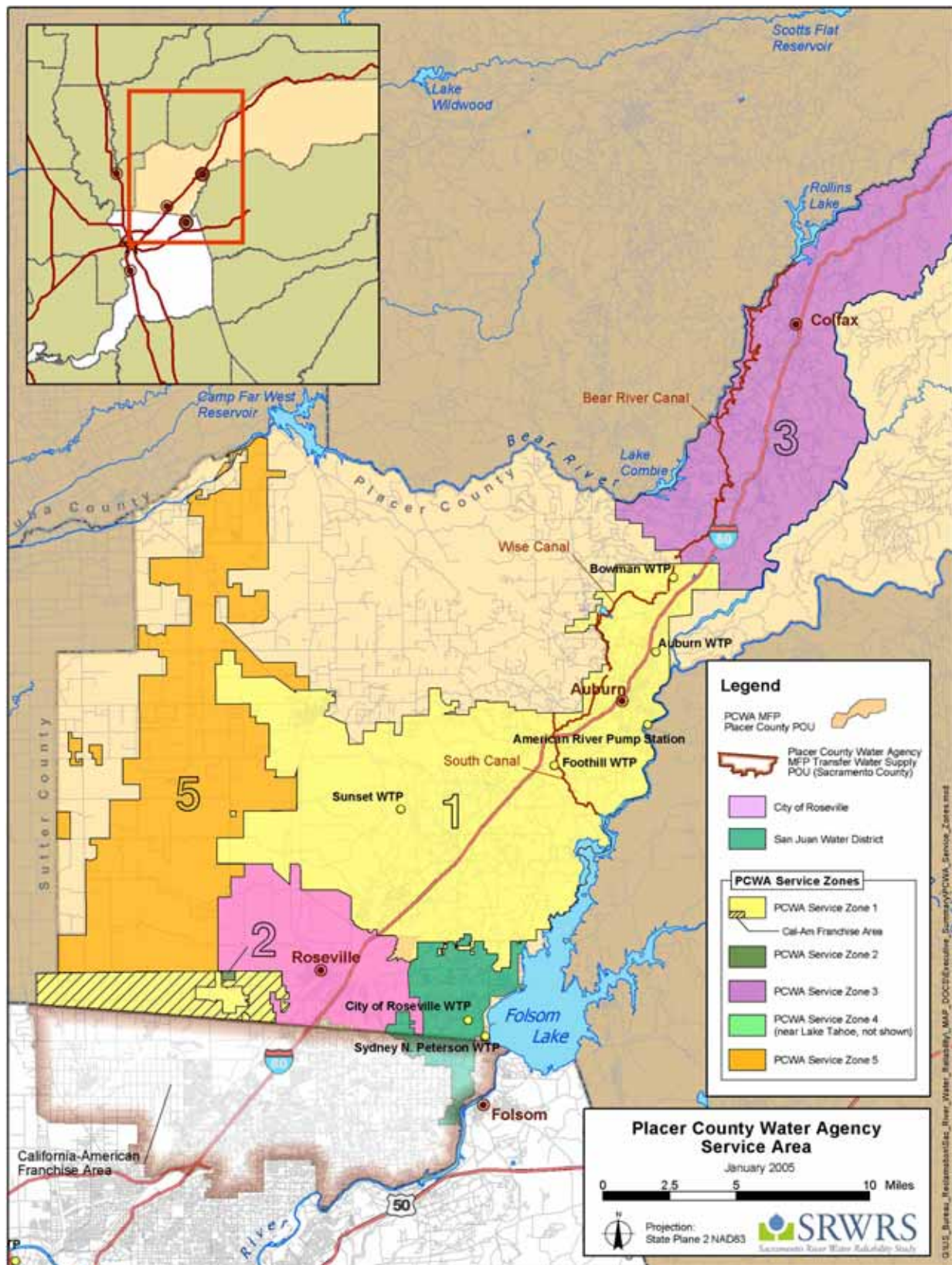


Figure 3-3. PCWA Service Areas

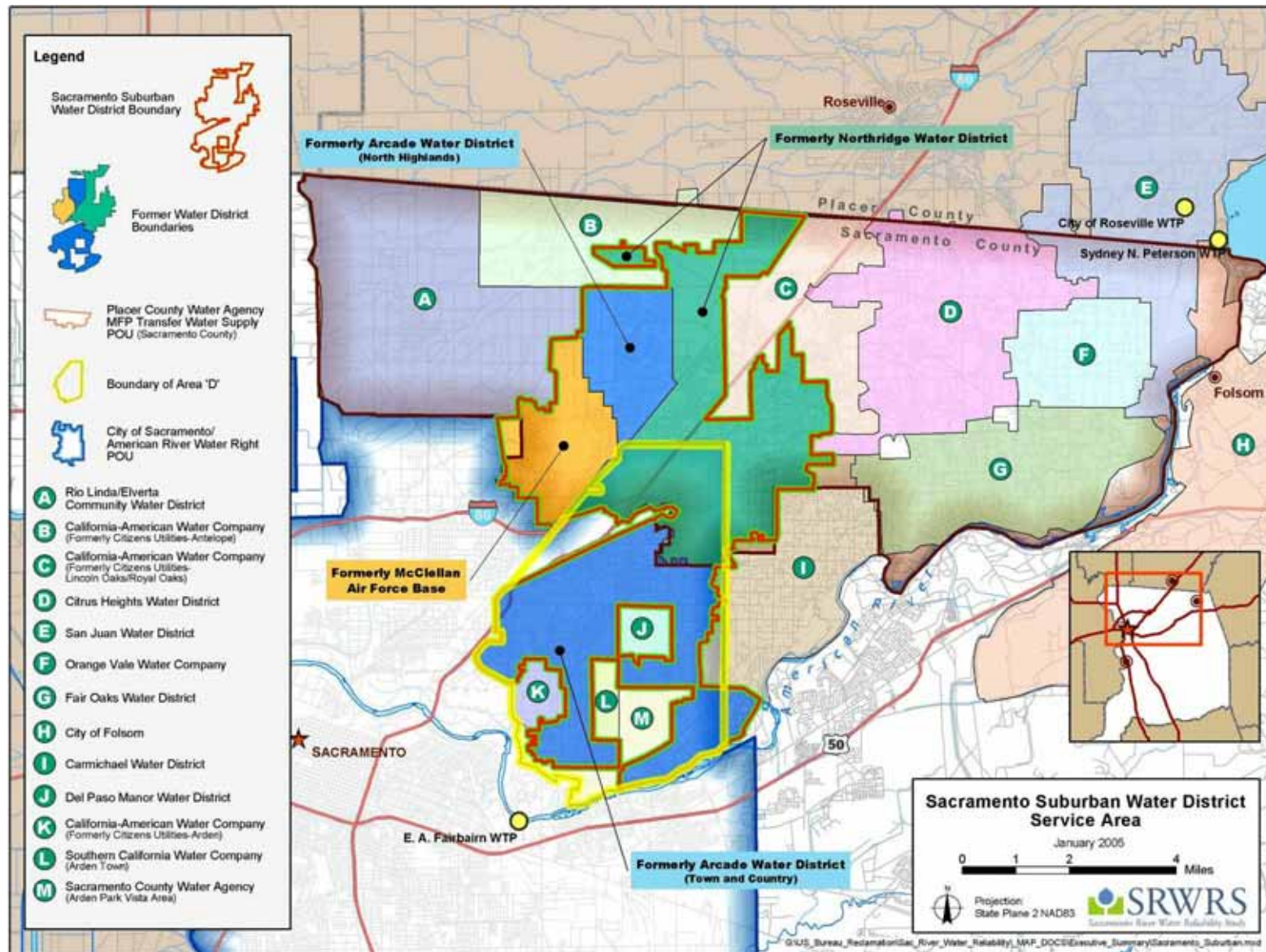


Figure 3-4. SSWD Service Areas

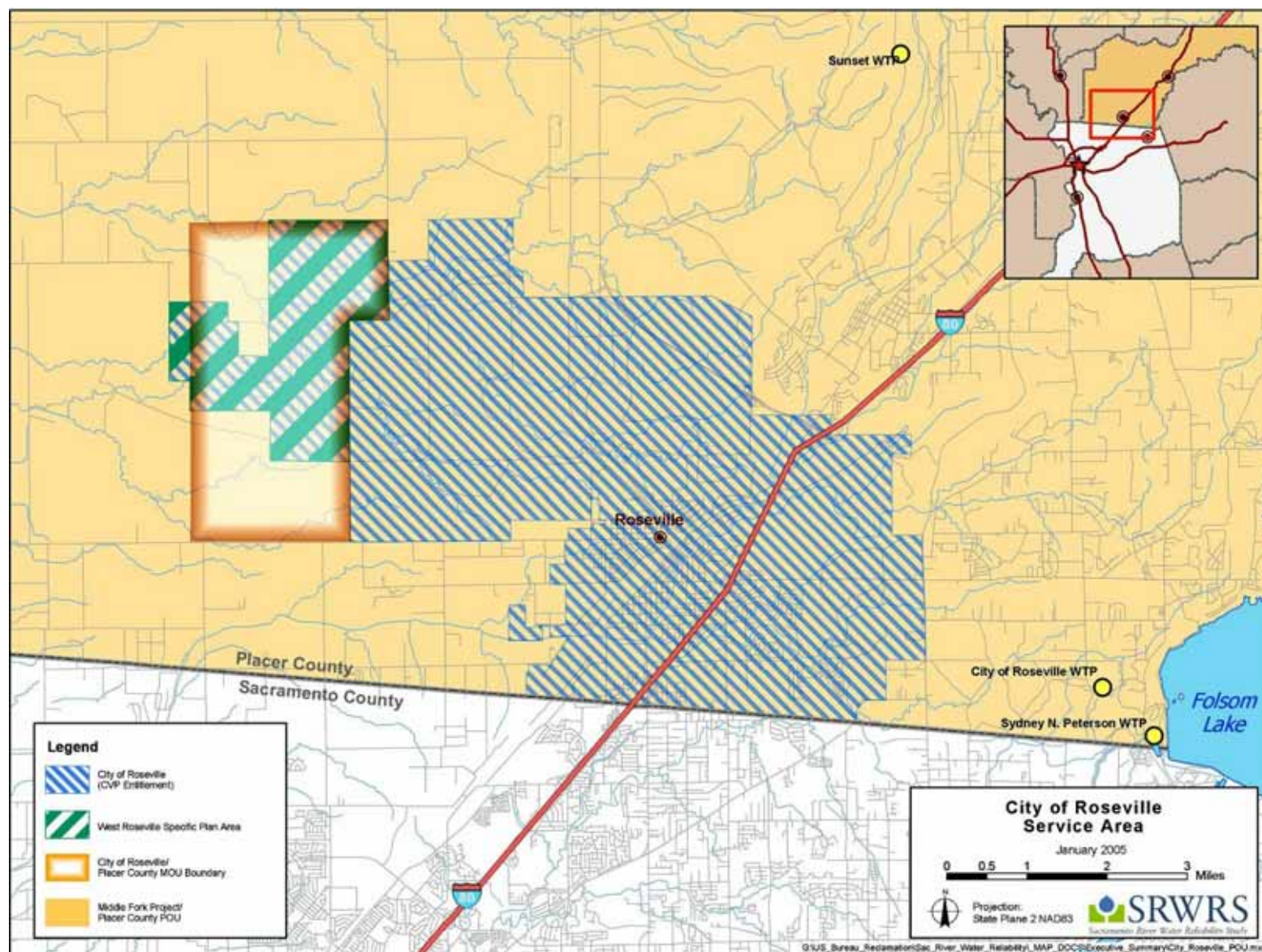


Figure 3-5. Roseville Service Areas

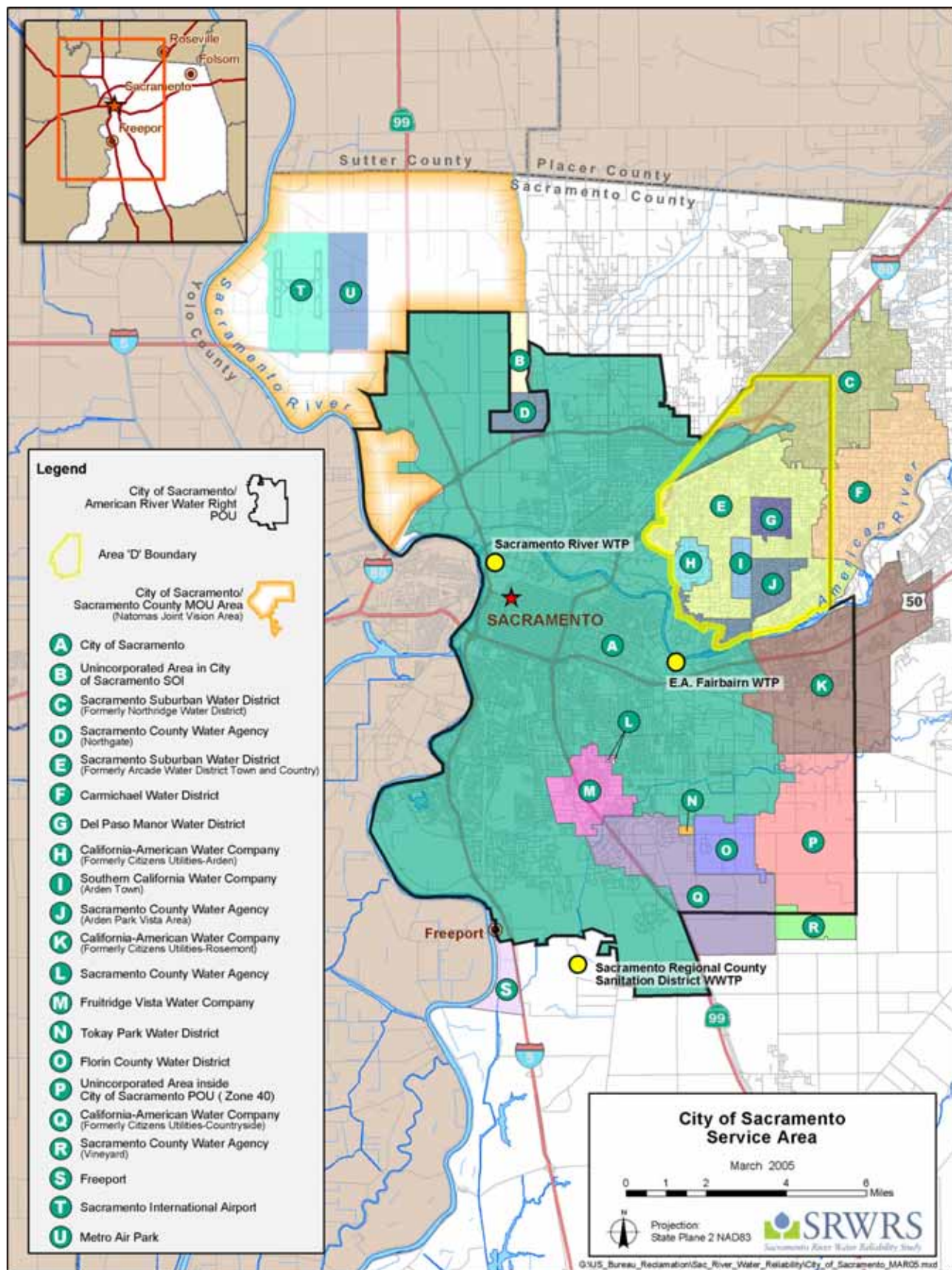


Figure 3-6. Sacramento Service Areas

WFA Water Management Actions for Environmental Purposes

As water supply demands for the cost-sharing partners increase, WFA water management actions for the purpose of environmental preservation become the major limiting factors for water supply reliability.

Reducing Future Diversions from the American River in Drier Years

Tables 3-6 and 3-7 summarize WFA year-type-dependent limitations on diversions from the American River for the cost-sharing partners that were stipulated in their corresponding WFA PSAs. The WFA defines year types for the American River Basin based on March through November unimpaired inflow to Folsom Lake, as follows: wet (above 1,600,000 AF), normal (between 1,600,000 and 950,000 AF), drier (between 950,000 and 400,000 AF), and driest years (below 400,000 AF).

Note that most purveyors are limited by diversion amounts; however, Sacramento is limited by the allowable diversion rate at the Fairbairn WTP depending on the bypass flow rate, and limited by the total annual diversion at the Fairbairn WTP in Water Forum driest years. These limitations restrict the SRWRS cost-sharing partners from exercising water rights and contract entitlements on the American River.

Releasing Supplemental Flow from Storage

Under the WFA, PCWA and Roseville would provide supplemental flows in Water Forum drier and driest years to the lower American River by releasing from PCWA's MFP storage. These releases are generally referred to as "replacement water."

The purpose of the replacement water is to offset reductions in flows in the lower American River due to increased future PCWA and Roseville diversions from the American River during drier and driest years. Replacement water would remain in the American River until it reaches its confluence with the Sacramento River. However, PCWA has agreed to release the replacement water from its MFP reservoirs only when a water transfer partner exists below the American River outlet.

Table 3-8 summarizes the responsibilities of providing replacement water as stipulated in the WFA. The source of replacement water is from reoperation of PCWA's MFP reservoirs; this operation would be further subject to refill conditions currently under negotiation between Reclamation and PCWA, and ongoing negotiation for the lower American River FMS.

Groundwater Basin Safe Yield

The SRWRS study area covers the WFA-defined North and South basins of groundwater in Sacramento County, and the Placer-Sutter groundwater basin north of the Sacramento county line. The North Basin is bordered by the American and Sacramento rivers and the Placer-Sacramento county line, and the South Basin is bordered by the American, Sacramento, and Consumnes rivers. The WFA has established safe yields¹⁵ of 131,000 AF per year for the North Basin, and 273,000 AF per year for the South Basin. These safe yields are close to anticipated groundwater use in these two basins, respectively, in the future under the WFA, allowing only limited deviation from WFA assumed conditions for water supply and conjunctive use.

The Placer-Sutter groundwater basin is hydraulically connected to the North Basin; however, the Placer-Sutter groundwater basin's safe yield has not been established by the WFA. Currently, PCWA is conducting a study for this purpose.

¹⁵ Safe yield is the maximum quantity of water that can be withdrawn from a groundwater basin over a long period of time without developing a permanent condition of overdraft. Sometimes referred to as sustainable yield.

Table 3-6. Summary of Water Rights and Contract Entitlements and the Associated WFA Limitations on Diversion by Cost-Sharing Partner

SRWRS Cost- Sharing Partner	Water Rights and Contract Entitlements (amount in AF per year)						WFA Limitations on Diversions by Water Forum Year-Type (AF per year)			
	American River		Sacramento River		Drum-Spaulding Canal System		Wet	Normal	Drier	Driest
	Amount	Source	Amount	Source	Amount	Source				
PCWA					100,400	PG&E	No specific limitations per the WFA			
	120,000 ^[1]	MFP					35,500	35,500	35,500	35,500
	35,000	CVP					0 ^[2]	0 ^[2]	0 ^[2]	0 ^[2]
SSWD	29,000 ^[1]	MFP					29,000	0 ^[2]	0 ^[2]	0 ^[2]
	26,064	Water rights (via Sacramento)					26,064	26,064	0 ^[2]	0 ^[2]
Roseville	32,000	CVP					} 54,900 ^{[3],[4]}	54,900 ^{[3],[4]}	39,800 to 54,900 ^{[3],[4],[5]}	39,800 ^[4]
	30,000 ^[1]	MFP								
	4,000	MFP (via SJWD)								
							4,000	4,000	0	0
Sacramento	245,000	Water rights					Depends on bypass flow at Fairbairn WTP ^[2] (see Table 3-7)			
			81,800	Water rights			No specific limitations per the WFA			

^[1] The 120,000 AF per year of PCWA MFP water rights includes 84,000 AF of water sales to SJWD (25,000 AF per year), Roseville (30,000 AF per year), and SSWD (29,000 AF per year).

^[2] The WFA anticipates and/or allows diverting forgone flows from the Sacramento River.

^[3] Includes transfer of 4,000 AF from SJWD in wet and average years.

^[4] WFA limitations are on the total amount of diversions from all sources.

^[5] Linearly proportional based on March-through-November unimpaired inflow to Folsom Lake between 400,000 and 950,000 AF.

Table 3-7. Summary of WFA Limitations on Sacramento's Diversions at Fairbairn WTP Under Its Water Rights

Criteria	Period	Maximum Diversion Rate at Fairbairn WTP	
		(cfs)	(mgd)
If the flow bypassing the diversion at the FWTP is greater than the Hodge Flows ^{[1],[2]}	1/1 – 12/31	310	200
If the flow bypassing the diversion at the FWTP is less than the Hodge Flows ^{[1],[3],[4]}	1/1 – 5/31	120	78
	6/1 – 8/31	155	100
	9/1 – 9/30	120	78
	10/1 – 12/31	100	65

^[1] Hodge Flows: Parties to the litigation (Environmental Defense Fund et al. v. East Bay Municipal Utility District) cannot divert water from the American River unless instream flows measure at least 2,000 cfs from October 15 through February; 3,000 cfs from March through June; and 1,750 cfs from July through October 14.

^[2] In accordance with wholesale agreements, Sacramento may deliver water diverted or treated at Fairbairn WTP to public or private water purveyors on a wholesale basis anywhere within the POU as it existed on January 1, 1997, when flow bypassing the Fairbairn WTP is greater than the Hodge Flow Condition.

^[3] Water diverted or treated at the Fairbairn WTP may be delivered on a wholesale or wheeling basis to any public or private water purveyors when bypass flow at the Fairbairn WTP is less than the Hodge Flow Condition, provided the rate of "pumpback" is equal to or exceeds the rate of delivery for these purposes on a daily basis. "Pumpback" is used to assume the existence of a metered raw water conveyance facility delivering water from near the confluence of the Sacramento and American rivers to the Fairbairn WTP.

^[4] For all conditions in extremely dry years (Water Forum driest years and/or when annual projected unimpaired inflow into Folsom Lake is 550,000 AF or less), and the annual diversion from Sacramento's water rights is further limited to 50,000 AF.

Table 3-8. Responsibility for Providing Replacement Water by Purveyor as Defined in the WFA

Water Forum Year Type	Annual Amount of Replacement Water ^[1] by Purveyor (AF)	
	PCWA	Roseville
Wet and Average	0	0
Drier	0 to 27,000 ^[2]	0 to 20,000 ^[2]
Driest	27,000	20,000

^[1] The water will be made available by reoperation of PCWA's MFP reservoirs. Releases will be contingent on the following conditions:

- PCWA's ability to sell the released water for use below the lower American River on terms acceptable to PCWA.
- PG&E's agreement to such reoperation until the present power purchase contract with PG&E expires in 2013.
- PCWA's determination that it has sufficient water in its reservoirs for additional releases to mitigate conditions in dry years without jeopardizing the supply for PCWA's customers. (Based on historical hydrology and projected 2030 requirements as set forth in the WFA, previous operational modeling shows that reoperation water should be available for such release and sale without drawing MFP reservoirs below 50,000 AF.)

^[2] Linearly proportional based on March-through-November unimpaired inflow to Folsom Lake between 400,000 and 950,000 AF.

Threat of Groundwater Contamination

Industrial contamination plumes have threatened groundwater resources in the Placer-Sacramento region. These contamination plumes have forced some drinking water wells to be taken out of service, and continued to threaten other local groundwater supplies.

Principal groundwater contaminant plumes in this area are known to exist from source areas at the former McClellan AFB, the former Mather AFB, and Aerojet. The most extensive contaminant from the former AFBs is trichloroethylene (TCE), and plume boundaries of 5 micrograms per liter ($\mu\text{g/L}$) are shown in **Figure 3-7**. Currently, a primary maximum contaminant level (MCL) of 5 $\mu\text{g/L}$ exists for drinking water. Horizontal and vertical migration of contaminant plumes for McClellan and Mather AFBs are understood, and a hydraulic capture zone has been established for the majority of the plumes to control contaminant migration.

TCE contaminant exists at the Aerojet site as well; however, perchlorate is a more widespread contaminant of greater concern, unique to the Aerojet site. Perchlorate was used as rocket fuel at the test site. A recent discovery of perchlorate contamination north of the American River was unexpected, indicating lack of control for perchlorate contamination or understanding of the migration pattern of perchlorate. This development heightened the threat to the water supply in Fair Oaks, Carmichael, and Rancho Cordova areas where groundwater is the sole or major source of water supply.

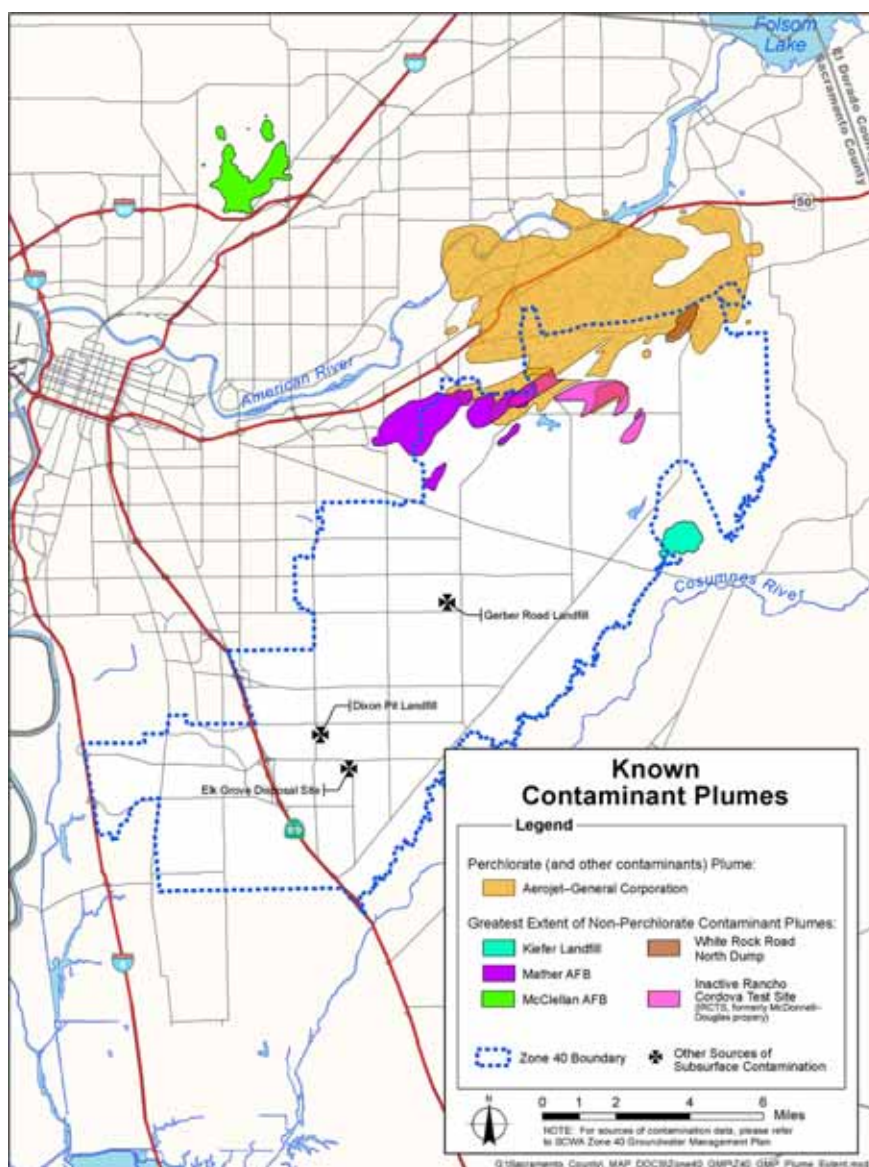


Figure 3-7. Map of Known Major Contamination in Sacramento County
(Source: SCWA, 2004, Zone 40 Groundwater Management Plan)